Technologies of Writing

Differential Geometric Performance

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Starting Places
How do we acquire intuitions about infinite or continuous things?
How do we represent continuous or infinite things with finite, discrete representations?

Where does the intersubjective power of mathematics come from?
“Damn machines”

Why have computers been so unhelpful in the doing of differential geometry?

(Media fusioning by MetaSynth)
Geometric Computation

Seeing vs Making
Technologies

Programming Languages

Visualizations (e.g. eversion of sphere)

Simulations

numeric, e.g. physics microworlds

scripted, e.g. mTropolis

(how to distinguish?

increase number of particles!)

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But what software was the most commonly dedicated to their scientific work?
TeX (why?)

Shallow: pure syntax of typeset ("pure" signifier).
No attempt to model meaning.
Hybrid Writing

Mathematica

Shallow: pattern rewrite

Multi-modal

Acts on itself
On Writing
Wittgenstein

“How does it come about that this arrow \(\rightarrow\) points?

...The arrow points only in the application that a living being makes of it.”

[Philosophical Investigations §454]
Writing: Derrida

“I have already alluded to theoretical mathematics; its writing -- whether understood as a sensible graphie ... (and that already presupposes an identity, therefore an ideality, of its form...), or understood as the ideal synthesis of signifieds or a trace operative on another level, or whether it is understood, more profoundly, as the passage of one to the other -- has never been absolutely linked with a phonetic production. Within cultures practicing so-called phonetic writing, mathematics is not just an enclave....This enclave is also the place where the practice of scientific language challenges intrinsically and with increasing profundity the ideal of phonetic writing and all its implicit metaphysics.”

[Grammatology 10]
Writing: Guattari

Recognition of these machinic dimensions of subjectivation leads us to insist, in our attempt at redefinition, on the heterogeneity of the components leading to the production of subjectivity.

Thus one finds in it:

1. Signifying semiological components which appear in the family, education, the environment, religion, art, sport...

2. Elements constructed by the media industry, the cinema, etc.,

3. A-signifying semiological dimensions that trigger informational sign machines, and that function in parallel or independently of the fact that they produce and convey significations and denotations, and thus escape from strictly linguistic axiomatics.

[Chaosmosis: An Ethico-Aesthetic Paradigm 4]
Olde Philosophy
Olde Philosophical Responses

Realist
Constructivist (NOT Social)
Formalist (Hibert)
Intuitionist (Brouwer)
Fictionalist (H. Field)
Responses

Cognitivism
Psychology
Logicism
Lakoff’s Metaphor Theory
Cognitivism in Sheep’s Clothing
Differential Geometric Performance
Mathematical Modes

Examples

Algebra -- sequence of homology groups
Freehand drawing -- almost embedded cmc
Analytic -- function growth, operators on $L^p$ spaces
Geometric -- notion of tangent space; curvature

[striated $T_p M$, Deleuze&Guattari Thousand Plateaus 373]

Kinetic -- Flow by mean curvature

Mode vs. Genre
Material Phenomenology

Husserl: evidence and intuition
Rota
Material...
Embodied...
Temporal...
Mathematics

Both poietic and technic
Both medium and object

Mathematics is a Mangling
Mangled Agencies

Andrew Pickering --

Human agency, Material agency, Disciplinary agency

Disciplinary agency

“Conceptual systems [like algebra], then, hang together with specific disciplined patterns of human agency, particular routinized ways of connecting marks and symbols with one another. Such disciplines -- acquired in training and refined in use -- carry human conceptual practices along, as it were, independently of individual wishes and intents.... It is ... the agency of a discipline -- elementary algebra for example -- that leads us through a series of manipulations within an established conceptual system.”

[Mangle of Practice 116]
Mangled Agencies

“The notion of discipline as a performative agent might seem odd to those accustomed to thinking of discipline as a constraint on human agency, but I want (like Foucault) to recognize that discipline is productive. There could be no conceptual practices without the kind of discipline at issue; there could be only marks on paper. [Mangle of Practice 116]

Mathematical structures serve as translation devices between diverse cultural elements (Latour)

If cultural extension in conceptual practice is not fully under the control of active human agents, due to the constitutive role of disciplinary agency, then the making of new associations...is nontrivial....[O]ne has to expect that resistances [and accommodations] will arise in the construction of new conceptual associations. [Mangle of Practice 119]
(Aside) Dimensionalizing Moves

Latour

matter | human
natural | social

Add another axis: degree of stabilization

Pickering

Three agencies

sponge

spectator | actor
substrate
Technologies of Writing
Technologies of Writing

Extend notion of writing
Roy Harris
from telementationalist to integrationalist
From documentarism, alphabetism and typographic reductionism
Rotman -- Diagrams, Techniques of mathematical Persuasion
Other modes (see above -- mathematical modes)
Exteriorization of thought

Leroi-Gourhan, Speech and Gesture.

Kittler’s media thesis (a little too strong?)

Writing technologies:

- are based upon non-communicative aspects of language
- are embedded in social practices;
- include gestures and other bodily moves coordinated with the written;
- give material form to abstract entities;
- enable the gradual and collaborative refinement of notions;
- involve non-linguistic as well as linguistic objects;
- generate “social” objects - objects which are upheld by and coordinate between more than one person.
Looking backward

Blackboard
larger than personal reach
copro-presence (no transport communication!)
performance
ephemeral writing (Bolter)
gesture

Examples
Alexandrov reflection argument (high dimensional)
Almost embedded surface
Maximum Principle => leaves of H-flow don’t stick
Better Blackboards?

Stanford Interactive Workspace & Mural Projects
Perceptual Landing Spot

Recall Derrida’ conjectured:

mathematical writing -- understood more profoundly, as the passage of sensible graphie [manner of writing] to the ideal synthesis of signifieds or a trace operative on another level...

But I’ve argued that there is no ideal, there is only one ontological layer, part of a larger project with Niklas Damiris.
Perceptual Landing Spot

Geometers habitually use non-textually mediated forms of extensive writing, a writing which is a fusion of graphic, algebraic, numeric, as well as discursive modes of performative experience.

This technology of writing, old and new, is what enables the supra-individual persistence and more, the disciplinary agency of mathematics.

Yes, it is constructed and objective in this constructed sense, BUT quite different from what social constructivists like Bloor or Ernest mean.

Not all the constructors are human.
field work

sponge

m1 m2 m3

what is human?

how to human?